Signature of Invigilators

1. .....

2. .....

Roll No. | | | | | |

(In figures as in Admit Card)

# COMPUTER SCIENCE AND APPLICATIONS

## Paper III

Roll No. .....

.....

(In words)

**D/03/19**

Name of Areas/Section (if any) .....

Time Allowed : $2\frac{1}{2}$ Hours]

[Maximum Marks : 200

**Instructions for the Candidates**

1. Write your Roll number in the space provided on the top of this page.
2. Write name of your Elective/Section if any.
3. Answer to short answer/essay type questions are to be written in the space provided below each question or after the questions in test booklet itself. No additional sheets are to be used.
4. Read instructions given inside carefully.
5. Last page is attached at the end of the test booklet for rough work.
6. If you write your name or put any special mark on any part of the test booklet which may disclose in any way your identity, you will render yourself liable to disqualification.
7. Use of calculator or any other Electronics Devices are prohibited.
8. There is no negative marking.
9. You should return the test booklet to the invigilator at the end of the examination and should not carry any paper outside the examination hall.

**પરીક્ષાર્થીઓ માટે સૂચનાઓ :**

૧. આ પૃષ્ઠના ઉપલા ભાગે આપેલી જગ્યામાં તમારી ક્રમાંક સંખ્યા (રોલ નંબર) લખો.

૨. તમે જે વિકલ્પનો ઉત્તર આપો તેનો સ્પષ્ટ નિર્દેશ કરો.

૩. ટૂંક નોંધ કે નિબંધ પ્રકારના પ્રશ્નોના ઉત્તર દરેક પ્રશ્નની નીચે આપેલી જગ્યામાં જ લખો. વધારાના કોઈ કાગળનો ઉપયોગ કરશો નહીં.

૪. અંદર આપેલી સૂચનાઓ ધ્યાનથી વાંચો.

૫. આ ઉત્તરપોથીને અંતે આપેલું પૃષ્ઠ કાચા કામ માટે છે.

૬. આ ઉત્તરપોથીમાં કયાંય પણ તમારી ઓળખ કરાવી દે એવી રીતે તમારું નામ કે કોઈ ચોકકસ નિશાની કરી હશે તો તમે આ પરીક્ષા માટે ગેરલાયક સાબીત થશો.

૭. કેલકયુલેટર અથવા ઈલેકટ્રોનિકસ સાધનો જેવાનો ઉપયોગ કરવો નહીં.

૮. નકારાત્મક ગુણાંક પદ્ધતિ નથી.

૯. પ્રશ્નપત્ર લખાઈ રહે એટલે આ ઉત્તરપોથી તમારા નિરીક્ષકને આપી દેવી. પરીક્ષાખંડની બહાર કોઈ પણ પ્રશ્નપત્ર લઈ જવું નહીં.

**FOR OFFICE USE ONLY**
**Marks Obtained**

| Question Number | Marks Obtained | Question Number | Marks Obtained | Question Number | Marks Obtained |
|---|---|---|---|---|---|
| 1 | | | | | |
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Total Marks Obtained.....

Signature of the co-ordinator.....
(Evaluation)

SEAL

## COMPUTER SCIENCE AND APPLICATIONS
## PAPER III

*Note* :—This paper has two Parts (A and B). *All* questions are compulsory.

## PART A

*Note* :—This part has *ten* short essay type questions of **16** marks each to be answered in about **300** words each.

1. (*a*) What are design criteria for instruction formats kept by computer designer ? 6

(*b*) Discuss "Horizontal *V/s* Vertical Microprogramming". 6

(*c*) What is addressing mode ? Explain immediate addressing, direct addressing and stack addressing. 4

*Or*

(*a*) Examine trade off involving both opcodes and addresses while designing instruction set. 6

(*b*) What is nanoprogramming ? Explain it. 6

(*c*) What is addressing mode ? Explain indirect addressing, indexing and registering. 4

2. Consider the following tables : 16

degree (degcode, name, subject)

candidate (seatno, degcode, name, semester, month, year, result)

marks (seatno, degcode, semester, month, year, papcode, marks)

Write SELECT statement for each of the following to display :

(*a*) all the degree codes which are there in the candidate table.

(*b*) the names of all candidates who have appeared for their MCA exam. in the order of name.

(*c*) for each student marks of different subjects along with paper code.

*Or*

Explain the following :

(*a*) Data integrity;

(*b*) 3NF;

(*c*) Role of DBA;

(*d*) OLAP.

3. (*a*) What do you mean by Authoring Tools ? Give the general features required in Authoring tool. List the features available in one of the popular Authoring tool. 8

(*b*) Describe the algorithm to determine one or more visions of a homogeneous in color of a given picture. 8

*Or*

(*a*) Describe the detailed working of high quality laser printer. 8

(*b*) What is the importance of frames in continuity for a vision system ? How many frames per second are generated usually in a TV system ? 8

4. (*a*) Explain the concept of inheritance with an example. 8

(*b*) What is an ambiguous grammar ? Illustrate with an example. 8

*Or*

(*a*) Explain the typical meaning of access modifiers private, public and protected. 8

(*b*) Describe how to build a DFA that is equivalent to a given NFA. 8

5. (*a*) Differentiate between asynchronous and synchronous transmission. What are the relative advantages and disadvantages of these with respect to efficiency, effects of error and cost ? 6

(*b*) (*i*) Differentiate between circuit switching and packet switching. 6

(*ii*) What is the role of data link layer in OSI model ? 4

*Or*

(*a*) What is modem ? Explain amplitude, frequency and phase modulation on sine wave carrier. What is QAM ? 6

(*b*) (*i*) Comment on "Multiplexing *V/s* Concentration". 6

(*ii*) What is the role of transport layer in OSI model ? 4

6. (*a*) Describe merge sort in pseudocode. 8

(*b*) Analyze the running time complexity of merge sort. 8

*Or*

(*a*) Describe Kruskal's or Prim's algorithm for finding a minimum weight spanning tree of a given graph. 10

(*b*) Show that

$T(n) = O(n^2)$ if

$T(n) = 2T(n/2) + O(n^2)$

$T(1) = 1$ 6

7. (*a*) Explain the difference between servlet and an applet. 8

(*b*) Given an abstract class

```
abstract class TwoDimShape {
        virtual int width( ) = 0;
        virtual int height( ) = 0;
        virtual int area( ) = 0;
};
```

Design concrete subclasses Rectangle and RightAngleTriangle with appropriate member variables and meaningful implementations of the virtual functions. 8

*Or*

(*a*) Explain encapsulation and its purpose. 8

(*b*) Explain polymorphism in connection with virtual functions and operator overloading. 8

8. (*a*) Discuss the major *four* measures of software quality. 8

(*b*) Which is more important—the product or the process ? Justify your answer. 8

*Or*

(*a*) Discuss different types of system testing. 8

(*b*) Why is a highly coupled module difficult to unit test ? 8

9. (*a*) Is it possible to combine segmentation and paging scheme ? If yes, what advantages does it have ? If no, why not ? Which memory management scheme has been used in UNIX and in NT ? 8

(*b*) Discuss advantages and disadvantages of placing functionality in a device controller, rather than in kernel. 8

*Or*

(*a*) Discuss necessary conditions for Deadlock. 6

(*b*) Discuss the benefits of Distributed File System compared to a Centralized File System. How has file system been implemented in NT ? 10

10. (*a*) Explain with examples :
What is WFFS ? What is modus ponens ? What is chain rule ? 8

(*b*) Describe the architectures of expert system and DSS. Why do we integration of expert system with DSS ? 8

*Or*

(*a*) Explain frame-based knowledge representation. When to use scripts-based knowledge representation ? 8

(*b*) What is DSS ? List the criteria for evaluating DSS tool. 8

## PART B

*Note* :—This part has only *one* question of **40** marks to be answered in about **800** words.

11. (*a*) Describe in brief essential idea behind the pumping lemma for regular languages and illustrate with the help of an example of a non-regular language. 10

(*b*) Describe the normal forms—Chomsky normal form and Greibach normal form. 10

(*c*) Describe the halting problem and show that it is undecidable. 10

(*d*) Define recursive sets and recursively-enumerable sets using the formalism of Turing machines. 10

*Or*

(*a*) Differentiate beween error correcting and error detecting codes. Explain any *one* error correcting code with example. 15

(*b*) Explain Lossy compression of image. 10

(*c*) Explain how compression of still image is done. 15

*Or*

(*a*) Solve the following LPP : 10

Maximize $Z = 5x_1 - 3x_2$

Subject to

$$\begin{aligned} 2x_1 + x_2 &\leq 10 \\ 4x_1 + 6x_2 &\leq 20 \\ -x_1 + x_2 &\leq 8 \\ 2x_1 - x_2 &\leq 12 \\ x_1, x_2 &\geq 0 \end{aligned}$$

(*b*) Solve the following assignment problem : 15

| | A | B | C | D |
|---|---|---|---|---|
| E | 10 | — | 12 | 8 |
| F | — | 12 | 16 | 10 |
| G | 8 | 10 | 10 | 12 |
| H | 12 | 16 | 14 | 8 |

(*c*) Discuss the solution outline with example to solve shortest path problem using either Dijkstra's *or* Moore's *or* nearest neighbourhood algorithm. 15

*Or*

(*a*) Discuss fuzzy association points for Traffic controller system. 20

(*b*) Explain Supervised Learning Neural Networks with example. 20

*Or*

(*a*) How does Thread differ from Process ? Explain how thread can be created under UNIX and under Windows. 10

(*b*) Which API call under Windows is used by an application each time when it is ready to read another message ? Explain it. 10

(*c*) What is I-node ? What is its role in File System ? 10

(*d*) What do you mean by filtering and regular expression ? Giving example discuss role of regular expression in any *one* of the filtering utility by considering at least *three* metacharacters of regular expression. 10